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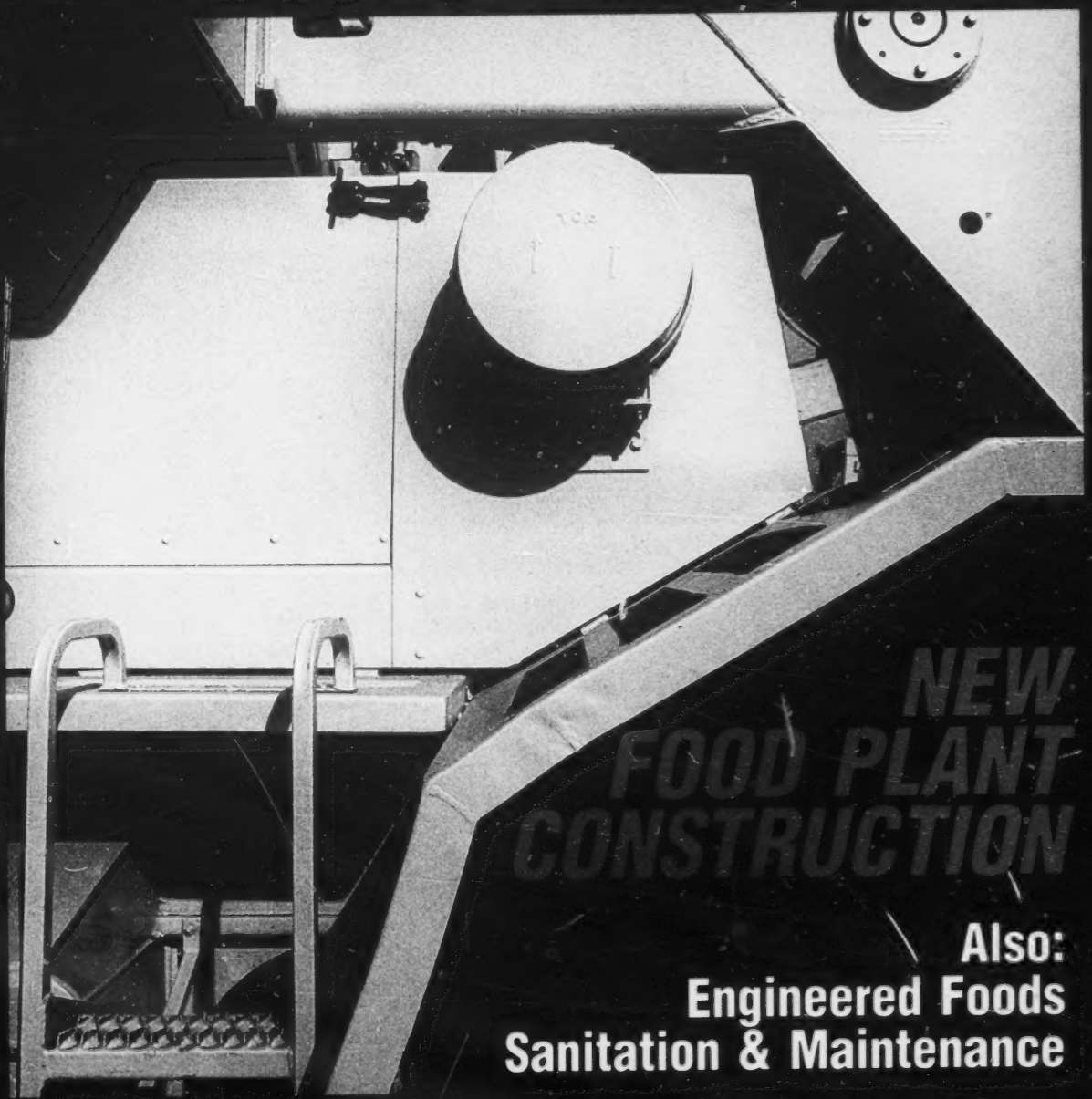
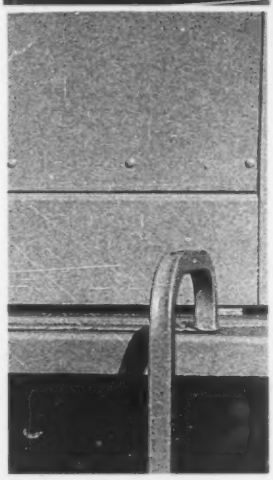
FOOD ENGINEERING



NEW FOOD PLANT CONSTRUCTION

Also:
Engineered Foods
Sanitation & Maintenance



COVER STORY

Our ninth annual New Food Plants Survey offers a detailed listing of who in the food industry is building, renovating or expanding and where it is taking place.

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14 Industry Report

This month's Report discusses a projected increased use of machine vision in the food and beverage industry, reflecting the strong requirement for high quality and virtually non-existent contamination; a discussion of RJR Nabisco's objectives by Chairman and CEO, J.Tylee Wilson and President and COO F. Ross Johnson; the 1986 Novo Biotechnology Award has been presented; a report on product code dates; and corporate news from the industry.

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What criteria does the food industry apply when deciding whether to build, expand or renovate? Several food companies discussed with FE how they made the decisions they made, and why.

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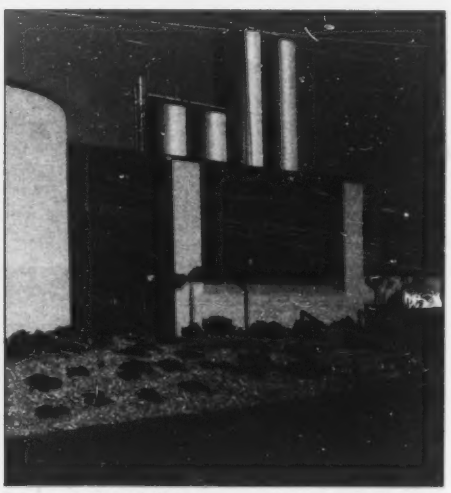
Sanitation experts have shared with FE some ways to avoid sanitation problems. This troubleshooting guide will help you to pinpoint your problems and show you ways to avoid them in the future.



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CHILTON FOOD GROUP

Engineered Foods

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Ralston Purina assembled a roundtable of food industry experts to discuss the recent report on recommended dietary protein intakes. This roundtable summary, an exclusive to FE, covers the discussion surrounding the implications of the report.

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This new high maltose sweetener (65 percent maltose, less than 4 percent dextrose) offers stability, clarity and reliability.

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Increased demand for oils high in oleic acid content results from recent studies relating them to reduced blood cholesterol levels.

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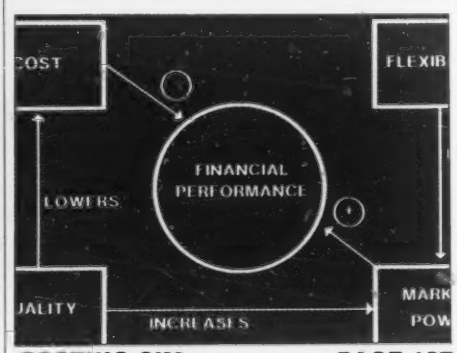

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Special Emphasis

PINPOINTING SANITATION PROBLEMS:
This month we went to industry experts in sanitation to determine how to pinpoint sanitation problems and how to avoid them.

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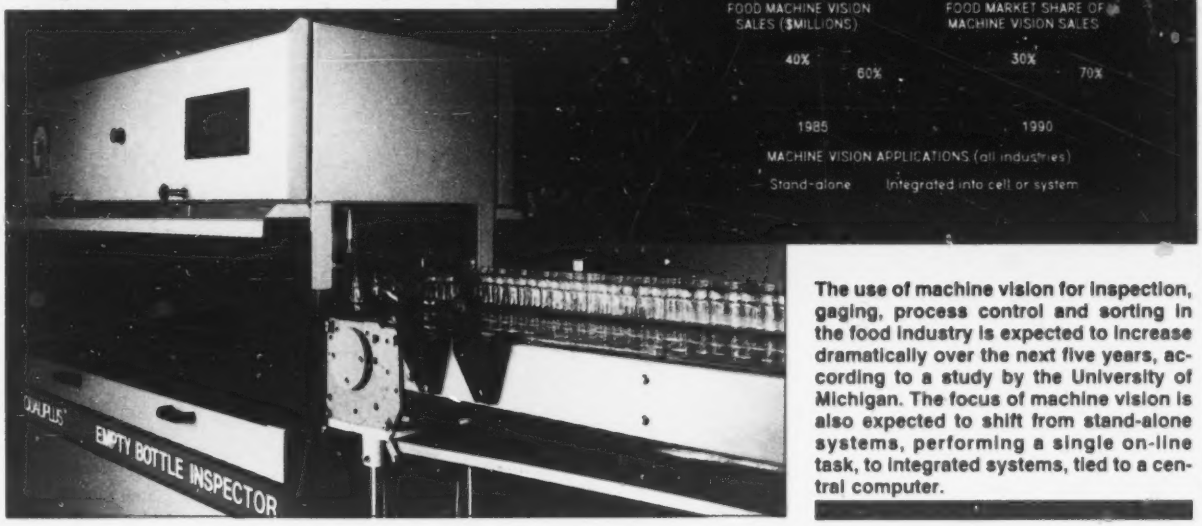
Food and beverage producers increase use of machine vision in an effort to protect product purity



The use of machine vision for inspection, gaging, process control and sorting in the food industry is expected to increase dramatically over the next five years, according to a study by the University of Michigan. The focus of machine vision is also expected to shift from stand-alone systems, performing a single on-line task, to integrated systems, tied to a central computer.

Motivated largely by its concern for product purity, the U.S. food and beverage industry will nearly double its use of machine vision inspection by 1990, concludes a report titled, "Machine Vision: Delphi Forecast to 1990,"conducted by the University of Michigan.

As of 1985, food and beverage producers were estimated to have invested $3.5 million in six percent of vision units purchased in the United States. That market share will increase to 11 percent, or $50.2 million, by 1990, according to the study. Food and beverage manufacturers will thus maintain a third place position behind the automotive and electronics industries, as major purchasers of machine vision units.

Expert panelists

The University's Industrial Development Division of the Institute of Science and Technology surveyed experts from the business and academic sectors for the report. Aside from inspection, panelists cited process control, sorting and gaging as the most promising applications of machine vision in the food and beverage industry. In consideration of these responses, the report said, "These applications reflect the strong requirement for high quality and virtually non-existent contamination in food and beverage items, both after production (inspection and gaging), and during (process control and sorting)."

The definition of what constituted a machine vision unit utilized by the study was one supplied by the Automated Vision Association: "Devices used for optical non-contact sensing to receive and interpret automatically an image of a real scene in order to obtain information and/or to control machines or processes."

The panelists agreed that the food industry will be the largest consumer of color vision. Color detection for quality control ranked only behind data processing speed for interest.

Algorithms, or problem-solving formulas, high-speed inspection and software were identified by panelists as vital topics of investigation to the food and beverage industry.

According to the study, the food industry will rely on x-ray scan equipment, video scan, and, to a minor extent, infrared and laser scan.

Forecast highlights

- Domestic sales of machine vision systems are expected to grow at rates between 50 and 82 percent per year, to an annual figure of approximately 15,000 by 1990.
- By 1990, some 70 percent of machine vision units are expected to be tied into an integrated cell or system.
- Depending on application, the cost of a typical basic machine vision unit is expected to range between $25,000 and $50,000 at present, falling to the range of $15,000 to $35,000 by 1990.
- While video will remain the predominant type of image sensor (80 percent in 1985, down to 64 percent by 1990), laser scanning is anticipated to increase significantly, from 10 percent to 22 percent over the forecast period.
- By 1990, 15 percent of all vision units will be equipped to utilize color.
- While only 5 percent of present vision units can perform three-dimensional analysis, that number for 1990 is predicted to be 30 percent.
- The most important technical barriers to more extensive use of machine vision in industry include: insufficient computational power, inadequate processing speed, and limitations in software. Other potential difficulties included camera technology limitations, illumination limitations and system reliability and durability.

Further information on the study is available from The Automated Vision Association, P.O. Box 3724, Ann Arbor, MI.

ENGINEERED Foods

Higher suggested dietary intakes of...

Protein

A recent FAO/WHO/UNU report recommends a new approach for estimating human protein requirements.

After the Food and Agriculture Organization (FAO), the World Health Organization (WHO), and the United National University's (UNU) report altering the recommended dietary protein intakes was released in late 1985, Ralston Purina Company assembled a roundtable of food industry experts (see box in center) to discuss the implications of the report. Those implications cover a wide spectrum of industry concerns including regulation, consumer health, labeling, the rapport between the scientific and academic communities, and, last but not least, new product development and the economics of finished food manufacturing. We thought you might want to listen in on what was said.

Participants, Ralston Purina Roundtable on Dietary Protein Intakes

Howard Bauman, Ph.D.
Pillsbury Company

Phyllis E. Bowen, R.D., Ph.D.
University of Illinois, Chicago

Robert Bursey, Ph.D.
Kraft, Inc.

Paul Hopper, Ph.D.
General Foods

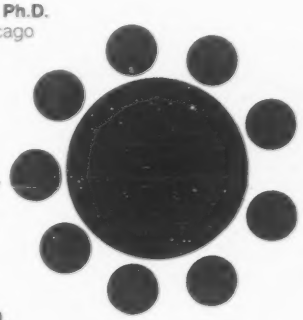
Charles Kolar, Ph.D.
Ralston Purina Company

Gilbert Leveille, Ph.D.
Nabisco Foods

Clyde Stauffer, Ph.D.
Cereal Foods World

Frederick Steinke, Ph.D.
Ralston Purina Company

Vernon Young, Ph.D.
Massachusetts Institute of Technology



Moderator: Could someone provide us with an overview of the World Health Organization's report?

Young: The FAO/WHO/UNU report recommended using a different approach to estimate human protein requirements than were suggested in a previous report released in 1973 by FAO/WHO. The new report states that the most appropriate approach in defining the protein requirements of man is to depend, as much as possible, on results from direct nitrogen balance studies.

This tends to result in higher recommendations than were made in 1973. For example, for healthy adults, the 1973 recommendations for a safe protein intake (one sufficient to meet the requirement for essential amino acids as well as total nitrogen) was approximately 0.6 grams per kilo per day of high quality protein. The 1985 recommendation is 0.75 grams per kilo per day. Balanced against this increase are changes in the recommendations concerning adjustments for differences in protein quality.

Another aspect of this report that differentiates it from the 1973 report is four amino acid patterns have been proposed as contrasted with the single pattern that was used in 1973. These four patterns are age-related. So, depending on the age group, a specific pattern of amino acids can be utilized for purposes of evaluating the capacity of the food protein sources to meet the requirements for the nutritionally essential amino acids.

The earlier recommendations for sulfur amino acids per unit of protein was 35 milligrams per gram of crude protein. But in the preschool group, the new report proposes the concentration be reduced by about a third, or to 25 milligrams per gram of protein. And this has significant implications with respect to predicting protein quality and those protein sources that might be thought to be limiting with respect to sulfur amino acid content.

Another aspect of the report which is important is that the data base used to define the protein and amino acid needs of man is principally from studies that have been carried out directly in humans, with very little reference to studies that have been conducted in

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non-human models. Rat data can be useful, however, particularly in the context of providing an index of digestibility. And the point is made that the only important protein quality component – in terms of normal diets in adult humans – is the issue of digestibility. The protein efficiency ratio (PER) is not an appropriate standard for precise prediction of human nutritional benefit.

Leveille: The criticism levied against the 1973 report is that by virtue of a scientific interpretation we have, in effect, wiped out protein deficiency in the less developed world. Clearly this new report will change that interpretation and, in fact, indicate an even greater need for protein.

Young: Insofar as the U.S. food industry is concerned, these changes have importance with respect to how the nutritional value of different food protein sources should be compared. Current regulatory procedures are inadequate for at least certain protein sources and tend to provide an inadequate prediction with respect to the capacity of these proteins to meet human requirements.

Moderator: What labeling regulations changes might be necessary?

Leveille: The most obvious one is the regulation which now requires that protein be labeled (or quantified) on the basis of its PER value. In effect proteins that have a PER in the range of 2.5 can be labeled on the basis of a 45 gram requirement; whereas if the PER is lower than that, a 65 gram requirement is used. If the FAO pattern was utilized, many proteins for which the 65 gram standard must now be utilized could be labeled on the basis of a 45 gram figure. This obviously applies to most plant proteins.

Steinke: That is about a 44 percent difference and would have a great significance for food manufacturers.

Young: On the basis of the work that has emerged over the last ten years, it has been shown that some vegetable protein sources perform much better in man than in the rat. And since the regulatory procedures are based at present on rat assay approaches, this has significant negative impact on the apparent ability of a plant protein source to meet given physiological needs in humans.

Dr. Gilbert Leveille of Nabisco Foods, Dr. Vernon Young, Massachusetts Institute of Technology, and Dr. Frederick Steinke of Ralston Purina were among those who met to discuss the implications of a FAO/WHO/UNU report on human protein requirements.

Moderator: Who should take the lead in trying to change regulations?

Leveille: It is important to recognize the difficult position industry representatives are placed in, since it appears we have a vested interest.

Hopper: We have to divide the problem into several pieces because there is no universal answer. With regard to science, there are some very definite and positive things the scientific community should take the lead in. It should provide the basis upon which the regulatory agencies can make the change without undue criticism.

As far as standards are concerned, there are powerful lobbies resisting those changes. This is an issue that needs to be dealt with a little bit at a time. The industry should be taking the lead here.

Regarding the protein situation, a task force consisting of people from the American Society of Clinical Nutritionists and other groups should be formed. They could come up with a white or position paper that lists things that the scientific community feels should be done to improve the well-being of the population.

Bauman: We have made a small move in the right direction by allowing the use of cheese substitutes rather than calling them imitation. But we need to go further than that.

Young: The recommendations made in this report are basically generated from studies that have been carried out directly with different food protein sources. The results of those studies were entirely predictable on the basis of the amino acid profile of the diets that were used in the experiments and from a knowledge of the protein digestibility. So for foods and protein sources for which reasonable data exist, an amino acid profile – determined by the appropriate methodology coupled with an estimate of digestibility – would be a predictor of the performance of that food when consumed by people. For radically different or new food protein sources, there is a need to generate data initially in a non-human model and then extend it into direct human studies.

Bowen: Since processing food can reduce the bioavailability of the amino acids present, perhaps with more specific chemical techniques now available we can sort out these changes and specify the quantities of each

amino acid.

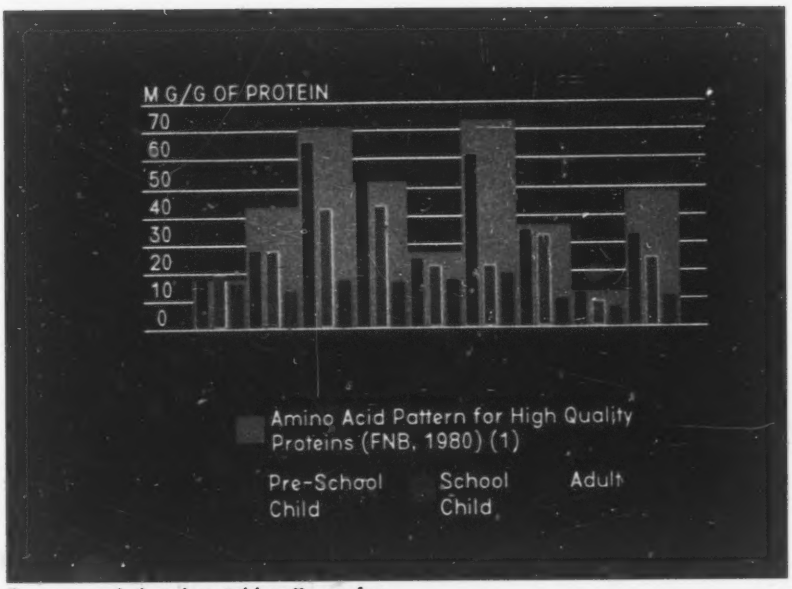
Moderator: Will the WHO report have any effect in improving diets in the United States and developed countries, and will the consumer have a better conception of soy protein?

Bauman: It might have some effect on the school lunch program and a few others. As far as the use of isolated soy protein, we have certainly not seen much reaction from consumers. The only time consumers reacted to soy protein was when the taste was not what they thought it should be. But as long as the flavor is there, they are not as concerned what protein they are using. In fact, vegetable proteins may have greater appeal than animal proteins to many consumers.

Stauffer: In working with clients we do not formulate to match amino acid patterns; rather we formulate from a functionality standpoint. Food products need a particular structure–amino acid makeup is secondary.

Kolar: You have to make food products that are highly acceptable, but with the constraints that we have today it is sometimes difficult. Regulations based on amino acid requirements would put things on a more realistic basis.

Bauman: Proteins ought to be permitted much as fats and sweetener substitutes can be used. This would open up more choices within a class of foods.



Recommended amino acid patterns for three age groups are compared to amino acid pattern of a high quality protein.

Bowen: As we become more convenience food-centered–especially in the U.S.–food manufacturers make more choices for people. Therefore, we have to make sure a wide range of options remain.

Steinke: Food patterns have changed in the last twenty years–there is a drive from consumers towards healthy foods. We now have to accelerate the manufacturers' capabilities of meeting these demands to provide healthy foods that are acceptable to consumers.

Moderator: What is the importance of this report in meeting dietary goals to help reduce the occurrence of chronic diseases?

Steinke: We have actually developed a number of food and prototype food products–particularly in the meat and cheese areas–using isolated soy proteins. For example, the fat content of frankfurters can be cut by 50 percent by using isolated soy proteins. If you consumed a 100 gram serving twice a day of these products, you could reduce the fat content from 40 percent of calories consumed to 30 percent. And other modified food products can be developed which reduce fat consumption by 30 to 35 grams per day.

Hopper: When we talk about formulating a food to cure a disease, the whole issue of health claims has to be made based on the total dietary intake and not on the composition of any given food.

Steinke: The food industry has a charge from the National Institutes of Health (NIH) to develop new food products to meet the national goal of

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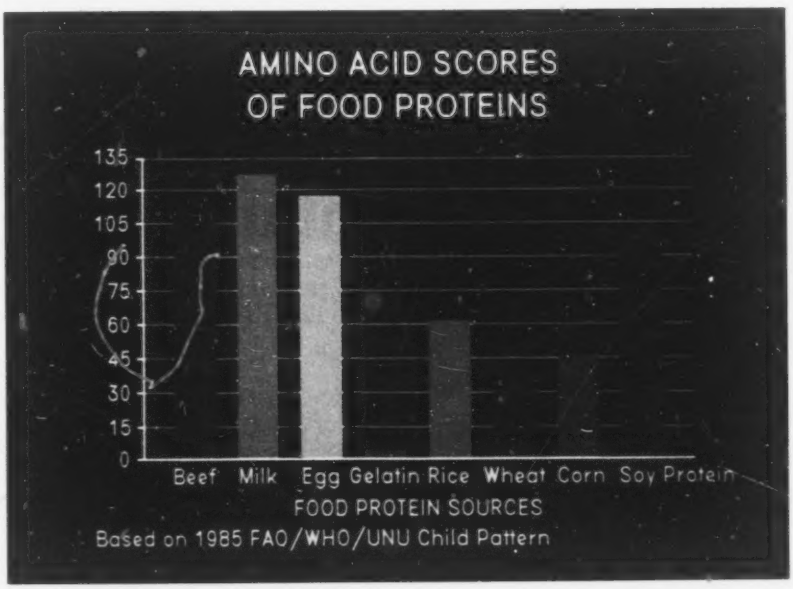
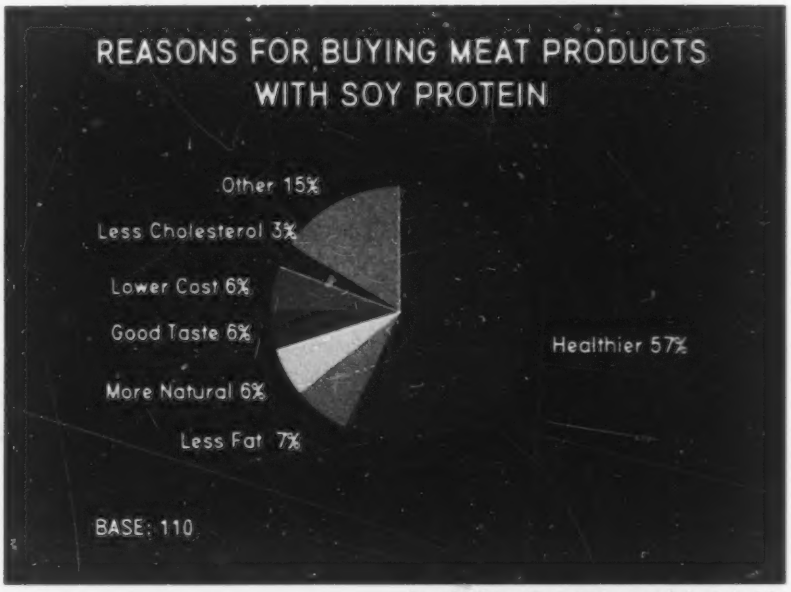


These amino acid scores of food proteins are based on the 1985 FAO/WHO/UNU recommendations for preschool children.



In addition, consumers are interested in meat products with soy protein because they perceive them to be "healthier."

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reduced fat and calories in food products. One of the ways that can be done is by using new food ingredients. But in order for them to be used, we have to have regulations based on human requirements which allow those ingredients to be incorporated into foods and labeled in such a way that will not turn people off.

Moderator: Could someone describe some of the new applications of isolated soy protein?

Kolar: Isolated soy proteins can be used in meat products such as sausages for reduced fat, calories, and cholesterol. They can also be used in non-dairy yogurt products or in nutritious beverages.

Leveille: It is important to focus on the four fundamental ways in which a source of protein such as this might be used. These are: For fortification; in analog foods; as functional protein ingredients; and in the engineering of totally new foods.

Kolar: One new food that has been on the market for a while now is frozen non-dairy desserts which seem to have created a niche in the market.

Moderator: What opportunity exists for entirely new foods?

Results of a nationwide survey suggest that soy protein be used properly so that taste is not adversely affected.

Steinke: A lot of flexibility exists with soy proteins of different functional characteristics. This creates much potential in developing new food products.

Hopper: In looking at today's trends and demographics, there is more and more food eaten away from home, more frequent meals, and more snacking. This tends to create new products in and of themselves – things that can be eaten out of hand which are shelf stable. These are the type products where ingredients such as soy isolates certainly have a place.

Bursey: There was a generation of youngsters who were exposed to large quantities of soy through the school lunch program before all of the acceptability issues were totally resolved. Do you sometimes get a sense from this generation that because of the bad experience with soy replacement in hamburgers and other foods in school lunch programs, they have some sense of rejection of soy-containing products?

Kolar: We conducted some consumer research about people's attitudes towards soy proteins in food products. The results indicate that people are willing to accept soy proteins in food products and find them as a healthy and acceptable alternative to meat.

Steinke: The real kickback came in 1972 and 1973 with unacceptable products in the grocery store. You need a period of time to get over that and that time has passed.

Moderator: How does the cost of isolated soy protein compare with other sources of protein?

Kolar: Let's take a hypothetical situation. Say we were going to make a nutritional bar with 25 percent of the

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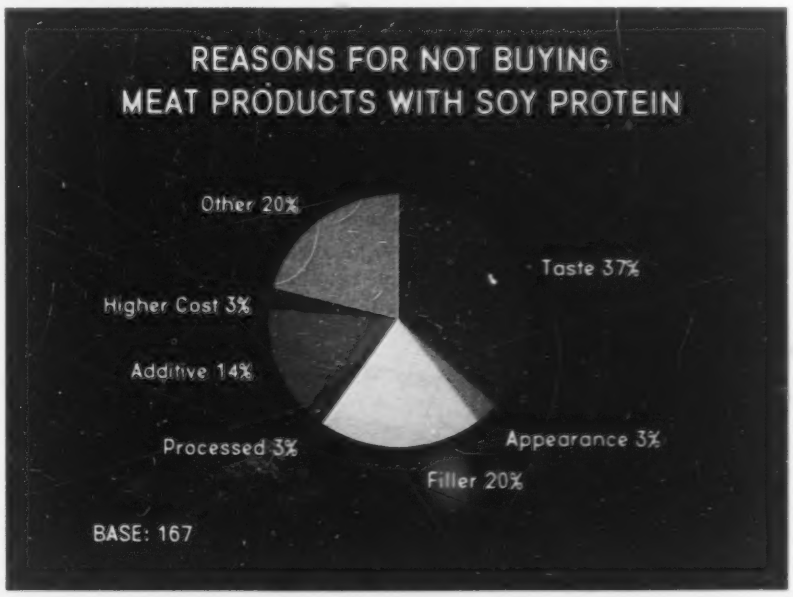

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RDA for protein. We decide that the PER should be 2.5 in order to use 45 grams as the basis of RDA calculations so we use casein because it has a PER of 2.5. Casein historically fluctuates highly in price.

The alternative would be to use isolated soy protein as a protein source. However, based on present regulations, we would have to use 65 grams since the PER is 1.8. Therefore, we would have to use several more grams of protein. This means two things: You may not be able to make as acceptable a product with increased protein, but if you could, it would cost more to make that product if casein and isolate were the same price.

Now, based on this new report, isolated soy proteins could be used at the same level as casein. There are times when isolate is 30 to 40 percent less expensive than casein. Milk proteins on a protein basis in the U.S. are two and a half to three times as costly as isolated soy protein, except casein.

Leveille: Isolated soy protein would be viewed as an alternative protein that would be utilized relative to its functionality and price.

Moderator: Any closing comments?

Steinke: The amino acid composition of isolated soy protein is certainly comparable with other standard proteins as far as humans are concerned. It offers the opportunity of a protein that can be widely used in many food products, and has the capability of being modified or changed to provide functional characteristics that can be used in a variety of foods.

Bursey: The demands that are being placed on the food supply in terms of meeting both real and perceived needs of the consumer as we move into the 21st century will require that certain issues, like convenience, become major product thrusts. New ingredients such as soy isolate can provide opportunities as well as new challenges for the food industry.

Hopper: The report indicated that the required estimates relate more closely to individuals than to populations. Nutrition is a young discipline. The ability to provide a broader spectrum of protein sources is an important dimension for the food industry.

Bauman: If we intend to get regulations changed concerning vegetable proteins, we need to reach a far wider audience than just talking to various societies. Things will move a lot easier through Food and Drug if the consumer is aware that vegetable proteins are good quality proteins.

Kolar: There is potential for significant change if the new informations on protein requirements can be carried through in terms of regulations. This will allow the food industry to take advantage of the new information by producing new food products acceptable to consumers.

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Who's building what, and where? Food Engineering's ninth annual look at new construction reveals all.

Food Engineering's ninth annual New Plants Survey – compiled from studies conducted by Conway Data, Inc. (Norcross, GA) and *Food Engineering* – reveals a record 332 new and expanded food plants completed or under construction during the past year, well up from 295 last year and dramatically up from the 201 plants reported in 1984.

Probable major reason for the two year surge in spending for new food plants: Falling interest rates. As of September 30, the prime rate stood at 7.5 percent, down 2 percent from a year ago and a full 5 percent from mid-1984.

Interestingly – just like last year – half (173 of the 332 plants surveyed) are expansions or renovations of existing plants, half are new construction.

A brief study of the following pages generally reflects current food industry trends but contains a surprise or two. Two unexpected revelations. First, as Sunbelt construction continues at a high level, the "Rustbelt" is fighting back (partly because of the initiatives that Rustbelt states are taking to bring industry back, and partly because of the concentration of research and educational institutions in these states). Second, an apparent "bakery boom." This year, 28 plants in the total survey are bakery plants (not including cookies), compared to only six last year.

Trends confirmed include:

•The snack food surge: No less than 32 plants – nearly 10 percent of the total – are snack food and cookie plants.

•Convenience foods: A score of ready-to-eat and heat-and-serve products produced in many plants can be classified as "convenience foods," but the trend is especially apparent in the fact that 31 plants are described as "prepared foods" or "frozen food" plants.

• Low fat/low cholesterol: This year, 23 new or expanded poultry plants are listed, on top of last year's 21.

In the following tables, "Site/Size" lists either site acreage or square footage of new plants where known, or indicates expansions/renovations if not a new plant. "Status & Date" refers to project status and date reported.

(Continued on page 68)

CHARLES. E. MORRIS
Midwest Editor

Company	Plant Location	Primary Product	Square Feet/cap.	Est. Cost ($-million)	Employees	Architects Engineers	Status & Date
A							
Ace Tomato Co.	San Joaquin, CA	Canned Veg.	Expansion	-	-	-	Planning 11/85
Adolph Coors Co.	Harrisonburg, VA	Beer	344 acres	70	1700	-	Construction 10/85
Advanced Foods	Iowa Falls, IA	Prepared Foods	-	-	23	-	Planning 8/86
AG Dynamic Syst.	Goodland, KS	Proc. sun seeds	3 acres	1.2	20	-	Construction 7/86
Agri-General	Kenova, WI	Pro[illegible]eggs	-	0.9	55	-	Planning 6/86
Algood Food Co.	Louisville, KY	Peanu[illegible]t./Prune Juice	-	1	26	-	Reported 10/85
All Amer. Gour met	Salt Lake, UT	Frozen Foods	-	-	300	-	Planning 12/85
Allison Cookie	Plant City, FL	Cookies	-	4.5	150	-	Planning 11/85
Alpha Coffee Co.	Chicago, IL	Coffee	-	-	-	-	Planning 12/85
Alpo	Pascagoula, MS	Pet food	-	-	-	Daniel Int'l	Reported 10/86
American Fructose	Dimmit, TX	Corn syrups	Expansion	4	121	-	Planning 8/85
American Packing	Durant, OK	Meat products	Expansion	-	50	-	Construction 5/86
American Potato	Moses Lake, WA	Pinto Beans	-	5.4	39	-	Construction 9/85
American Rice	Freeport, TX	Milled rice	20 acres	50	300	-	Construction 11/85
American Seaway	Bedford Hts., OH	FF whse.	Expansion	1.2	-	-	Construction 11/85
Anheuser-Busch	Columbus, OH	Beer	Renovations	-	-	MK-Ferguson	Continuing
Anheuser-Busch	Ft. Collins, CO	Beer	1.3MM sq. ft.	300	-	MK-Ferguson	Completion '88
Anheuser-Busch	Houston, TX	Beer	Expansion (550Msq.ft)	-	-	MK-Ferguson	Completed 4/86
Anheuser-Busch	Los Angeles, CA	Beer	Renovations	-	-	MK-Ferguson	Startup 5/87
Anheuser-Busch	St. Louis, MO	Beer	Renovations	-	-	MK-Ferguson	Continuing
Anderson Clayton	Jacksonville, IL	Edible oils, prepared fds	-	-	-	-	Planning 9/85
Aquaculture Prod.	Greenwood, MS	Catfish	Expansion	3	49	-	Planning 9/85
Arizona Products	Yuma City, AZ	Canned citrus	Expansion	5.1	140	-	Planning 1/86
Armour Foods	Springfield, KY	Cheese,butter,dried milk	Expansion	2	30	-	Planning 6/86
Atlantic Food Service	Prince Wm. City, VA	Prepared foods	-	8.3	-	-	Planning 11/85
Autocrat Co.	Lincoln, RI	Flavors,coffee-rel. pd	5 acres	-	-	-	Planning 11/85
Avalon Baby Foods	Sutter, CA	Frozen baby foods	Expansion	-	-	-	Planning 11/85
Azteca Milling	Edinburg, TX	Corn flour	Expansion	6	-	-	Completed 11/85
B							
Barq's, Inc.	Biloxi, MS	Soft drinks	Expansion	-	-	-	Reported 10/85
Bar-S Foods	Clinton, OK	Lunch meats	Expansion	1	40	-	Reported 8/85
Bar-W Meat/Poultry	Ft. Worth, TX	Process Meats	-	2	30	-	Planning 7/86
Basic Veg. Prods.	Hanford, CA	Garlic, onion	10 acres	-	55	-	Construction 1/86
Beatrice	Sylvester, GA	Peanut butter	-	-	100	-	Planning 8/86
Beatrice	Mayville, WI	Cheese pkg.	-	-	200	-	Completed 11/85
Beckman Produce	Beloit, WI	Prepared fds.	-	1	20	-	Planning 9/86
Bell Brands	Santa Fe Springs, CA	Corn, potato chips	166M sq. ft.	13.6	-	Austin Co.	Reported 9/86
Best Foods	Ashbough, NC	Soup, sauces	-	-	-	Daniel Int'l	Reported 10/86
Bev-Pak	Glenville, NY	Soft drinks	Expansion	1.2	40	-	Planning 12/85
Big Stone Cheese	Big Stone Cty, SD	Cheese	Expansion	1.5	10	-	Planning 11/85
Bil Mar Foods	Zeeland, MI	Turkey proc.	-	40	-	-	Construction 9/85
Bitesized Candies	Casey, IL	Candy	25 acres	2	275	-	Planning 12/85
B.K. Foods	Gadsden, AL	Proc. chicken	15 acres	2.5	100	-	Construction 8/86

Company	Plant Location	Primary Product	Square Feet/cap.	Est. Cost ($-million)	Employees	Architects Engineers	Status & Date
Borden	Austin, TX	Milk	50M sq. ft.	-	-	Daniel Int'l Hixson	Completion 3/8
Borden	Tallahassee, FL	Dairy prod.	3 acres	35	60	-	Planning 6/86
Brookshire Groc.	Tyler, TX	Dist. ctr.	Expansion	6.5	-	-	Construction 9/86
Broome City Meat	Sanford, NY	Meat packing	-	13	175	-	Planning 11/85
Burger King	Aurora, CO	Dist. ctr.	8 acres	-	-	-	Planning 2/86
		C					
Cadco	Urbandale, IA	Soybean oil	Expansion	1.5	-	-	Planning 11/85
Cagle's	Atlanta, GA	Prepared foods	Expansion	3	150	-	Construction 4/86
Caldwell Sugar	Thibodaux, LA	Molasses	Expansion	1	55	-	Construction11/85
California Cooler	San Joaquin, CA	Beverages	Expansion	-	-	-	Planning 11/85
Calistoga	Napa, CA	Mineral water	Expansion	-	-	-	Planning 11/85
Campbell Soup	Camden, NJ	Canned foods	Renovation	37	-	-	Completion 1989
Campbell Soup	Marshall, MI	Refrig. soups/ sauces	Exp. (12Msq.ft)	2.9	15	-	Completed 1/86
Campbell Soup	Stanislaus, CA	Soup	Expansion	-	-	-	Planning 11/85
Cargill	San Bernardino, CA	Grain milling	Expansion	-	-	-	Planning 11/85
Cargill	Montezuma, CA	Poultry Prod.	-	30	-	-	Planning 6/86
Caramagno Foods	Detroit, MI	Warehouse	-	1.5	-	-	Planning 1/86
Carnation Co.	Othello, WA	Potato proc.	Expansion	18	60	-	Construction 4/86
Carolina Turkeys	Garner's Chapel, NC	Turkey prod.	700 acres	20	1,000	-	Construction 9/85
Castle & Cooke	Waikele, HI	Canned pineapple	Expansion	50	-	-	Planning 9/85
Cathay Foods	Joliet, IL	Soy sauce, tofu	10 acres	-	45	-	Construction 4/86
Cent.IL Snack Food	Springfield, IL	Potato Chips, snacks	4 acres	1.1	40	-	Completed 10/85
Central Okla. Fds.	Ft. Gibson, OK	Soft drinks	Expansion	-	56	-	Completed 11/85
CFS Continental	Stockton, CA	Buns	-	8	-	-	Completion 12/86
Chef Pierre	Forest, MS	Frozen bakery	Expansion	5	125	-	Completed 11/85
Chung Bo Foods	Trenton, MO	Chinese foods	-	-	20	-	Construction 1/86
Circle A Packing	Harper, KS	Meat packing	Expansion	1.2	40	-	Planning 2/85
Clark Candy Co.	Pittsburgh, PA	Candy bars	80M sq. ft.	-	80-100	Siebert Eng.	Startup 10/86
Coca-Cola	Anapolis, MD	Coca-Cola	Expansion	9.8	8	-	Completed 5/86
Coca-Cola	Portland, OR	Soft drinks	-	10	-	-	Planning 12/85
Coca-Cola Btlg.	Cincinnati, OH	Coca-Cola	Expansion	12	-	-	Construction 9/85
Coca-Cola Btlg.	Jackson, MO	Coca-Cola	Expansion	1.6	10	-	Completed 12/85
Coca-Cola Btlg.	Louisville, KY	Coca-Cola	Expansion	1.0	-	-	Planning 6/86
Coloma Fzn. Foods	Hagar Twnshp, MI	Frozen foods	Expansion	1.5	7	-	Construction 9/85
ConAgra	Milford, DE	Poultry proc.	Expansion	-	150	-	Planning 1/86
Concord Farms	Concord, NC	Poultry (ducks)	Expansion	4.3	-	-	Planning 11/85
Consolidated Bev.	Orange, CA	Liquor whse.	Expansion	-	-	-	Planning 11/85
Contadina Foods	Hanford, CA	Dist. ctr.	Expansion	1.2	-	-	Completed 9/86
Cookie Baron	Salem, OR	Baked prod.	-	-	40	-	Planning 11/85
CPC Int'l	Argo, IL	Corn wet milling	Expansion	-	-	Daniel Int'l	Phase 2 comp. '86
Cosby Hodges	Ocala, FL	Pet foods	7 acres	1.5	40	-	Construction11/85
Cracker Jack	Northbrook, IL	Caramel corn	60M sq. ft.	-	150	Siebert Eng.	Startup 7/86
Crane Potato Chip	Springfield, IL	Potato chips	-	-	-	-	Planning 12/85
Creative Foods	Amboy, IL	Prepared foods	-	-	50	-	Planning 11/85
Cream O'Weber	Salt Lake, UT	Dairy products	-	-	-	-	Construction 9/85
Cuba Cheese	Cuba, NY	Cheese	Expansion	13	40	-	Planning 12/85

(Continued on page 72)

Company	Plant Location	Primary Product	Square Feet/cap.	Est. Cost ($-million)	Employees	Architects Engineers	Status & Date
D							
Daily, Inc.	Missoula, MT	Sliced bacon	Exp. (8M sq. ft.)	1.2	-	Austin Co.	Startup spring'87
Dairymen's Co-op	Tulare, CA	Cheese	4 acres	12	180	-	Construction 4/86
Dairymen, Inc.	Wilkeboro, NC	Milk	Renovations	-	-	Hixson	Completed 9/86
Dandy Distributors	Danbury, CT	Dist. ctr.	7 acres	6.5	55	-	Planning 12/85
Dawn Enterprises	Walhalla, ND	Ethanol (barley)	7 acres	32.6	-	Ultrasystems	Reported 9/86
Daytona Budweiser	DeLand, FL	Beer dist. ctr.	10 acres	1.3	7	-	Planning 12/85
Dean Foods	Huntley, Il	Whse.	Expansion	-	-	-	Construction 10/85
Delice de France	Buffalo Grove, IL	Baked goods	-	2.5	25	-	Planning 7/85
Delicious Foods	Grand Island, NE	Frozen foods	-	8.5	210	-	Planning 1/86
Delmonico Foods	Louisville, KY	Pasta	Expansion	2	-	-	Planning 6/86
Del Monte	Modesto, CA	Distr. ctr.	-	-	-	-	Completed 6/86
Del Monte	Oxnard, CA	Canned foods	Expansion	5	100	-	Completed 11/85
Del Monte FF	Russelville, AR	Frozen foods	Expansion	3	-	-	Construction 6/86
Deltown Chemurgic	Fraser, NY	Ingredients	40M sq. ft.	-	50	-	Startup 12/85
D.E. Stauffer	Chicago, IL	Cookies	-	4	-	-	Planning 9/85
D.H. Foods	Omaha, NE	Muffins	Expansion	1	25	-	Construction 2/86
Di Paolo Baking	Rochester, NY	Baked goods	Expansion	1.2	-	-	Planning 7/86
Doane Products	Ocala, FL	Pet food	7 acres	1.1	35	-	Completed 9/85
Dolly Madison	Emporia, KS	Cakes, donuts	-	1	-	-	Reported 7/85
Domaini Clos Pegas	Napa, CA	Wine	Expansion	-	-	-	Planning 11/85
Dona Ana	Hatch, NM	Flour milling	5 acres	4	25	-	Planning 11/85
Doskocil Cos.	Hutchinson, KS	Pepperoni	Expansion	-	-	-	Completed 9/85
DPM of Arkansas	Booneville, AR	Proc. meats	Expansion	1.2	-	-	Planning 12/85
E							
Eagle Snacks	Fayetteville, TN	Snack Foods	Expansion	25	200	MK-Ferguson	Completion 6/87
Eagle Snacks	Robersonville, NC	Snack Foods	Renovations	-	-	MK-Ferguson	Completed 6/86
Eagle Snacks	Visalia, CA	Snack Foods	250M sq. ft.	-	400	MK-Ferguson	Startup late '87
Eden Foods	Saline, MI	Prepared foods	5 acres	7.5	39	-	Construction11/85
Eileen Gilday	Glassport, PA	Taffey	25M sq. ft.	-	25	Siebert Eng.	Startup 3/86
Exmet of KY	Louisville, KY	Micronutrients	-	1.3	40	-	Planning 11/85
F							
F & A Dairy of Cal.	Stanislaus, CA	Dairy products	Expansion	-	-	-	Planning 11/85
Fantasia Confect.	Sedalia, MO	Baked desserts	-	1.8	40	-	Construction 9/85
Farm Fresh	Lincoln, OK	Milk	Expansion	16.5	300	-	Planning 11/85
Fiorucci Foods USA	Chesterfield, VA	Proc. meats	190 acres	9.5	225	-	Planning 12/85
Flavor House Prod.	Dothan, AL	Roasted nuts	150M sq. ft.	-	200	Siebert Eng.	Startup 9/86
Flowers Baking	Bradenton, Fl	Baked goods	20 acres	6	115	-	Planning 11/85
Flowers Baking	Fairfield, TX	Baked goods	-	-	-	Daniel Int'l	Reported 10/86
Food Services Co.	St. Peter's, MO	Prepard foods, pkg. dist.	-	5	125	-	Construction11/85
Foremost Foods	West Haven, CT	Meat, poultry	-	-	10	-	Planning 9/85
Forest & Farm	Portland, OR	Mushrooms	Expansion	0.4	14	-	Planning 12/85
Four Paws Prod.	Hauppage, NY	Pet foods	Expansion	2.4	64	-	Planning 11/85

(Continued on page 74)

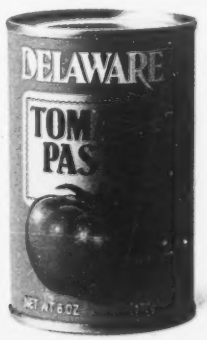
Company	Plant Location	Primary Product	Square Feet/cap.	Est. Cost ($-million)	Employ-ees	Architects Engineers	Status & Date
Franz Bakery	Portland, OR	Baked goods	Expansion	2.8	26	-	Planning 3/86
Freeze Point	Kankakee, IL	FF dist. ctr.	-	5.5	45	-	Planning 6/86
Friendship Dairies	Belmont, NY	Milk products	Expansion	3.3	-	-	Planning 2/86
Fresh Start Bak.	San Joaquin, CA	Buns	Expansion	-	-	-	Planning 11/85
Frito-Lay	Bakersfield, CA	Snack foods	160M sq. ft.	-	300	Daniel Int'l	Start-up mid '86
Frito-Lay	Dallas, TX	Snack foods	Renovation	-	-	MK-Ferguson	Completed 4/86
Frito-Lay	Frankfort, IN	Snack foods	Expansion	-	200	-	Planning 5/86
Frito-Lay	Perry, GA	Snack foods	120M sq. ft.	-	300	Daniel Int'l	Construction 6/86
Frito-Lay	Pulaski, TN	Snack foods	Expansion	-	-	Hixson	Completed 1/86
G							
Garner-Hart	Sanford, NY	Meat Packing	-	12.3	350	-	Planning 9/85
General Foods/ Birdseye	Fulton, NY	Frozen fruits, veg.	Expansion	3	100	-	Completed 7/86
Gerber	Ft. Smith, AR	Canned baby fd.	Expansion	11.9	-	-	Construction 6/86
George's Co.	Butterfield, MO	Poultry proc.	244 acres	10	400	-	Planning 9/86
Georgia Spice	Atlanta, GA	Spices	2 acres	-	-	-	Planning 11/85
G. Heileman	Milwaukee, WI	Draft beer	-	6	34	-	Completed 6/86
G. Heileman Baking	Milwaukee, WI	Bread	Renovations	2.5	50-100	-	Planning 10/85

Company	Plant Location	Primary Product	Square Feet/cap.	Est. Cost ($-million)	Employ-ees	Architects Engineers	Status & Date
Gilster-Mary Lee	Steelville, IL	Sugar	Expansion	1.5	10	-	Completed 11/8
Gilster-Mary Lee	Perryville, MO	Cake mix, cereal	Expansion	2	-	-	Completed 9/86
Gold Bond Ice Cr.	Ocala, FL	Ice cream nov.	Expansion	4.5	40	-	Construction11/85
Gold Bond Ice Cr.	Sikeston, MO	Ice cream nov.	Expansion	-	70	-	Planning 10/85
Golden Cheese Cal.	Corona, CA	Cheese butter,proteins	166M sq. ft.	q10	166	Petit Proj.	Startup 10/85
Golden Flake	Birmingham, AL	Snack foods dist.	Expansion	3	-	-	Construction 8/86
Golden States	City Industry, CA	Fresh salads	166M sq. ft.	5	-	Austin Co.	Startup 6/86
Golden Triangle	Pt. Arthur, TX	Shrimp	1 acre	1.2	75	-	Planning 11/85
Gold Kist	Boaz, AL	Poultry	Expansion	-	200	-	Planning 11/85
Grain Proc. Corp.	Muscatine, IA	Maltodextrins corn syrp.	Expansion	-	-	-	Completed 2/86
GrandMet USA	Fresno, CA	Cheese	-	75	-	-	Reported 10/85
GrandMet USA	Pascagoula, MS	Pet foods	Expansion	1	-	-	Reported 11/85
Great Lakes Cheese	Adams, NYIL	Cheese	Expansion	4	-	-	Construction 7/86
Guernsey-Dell	Chicago, IL	Ice cream flav.	-	-	136	-	Construction 9/85
Guth Dairy	Lake Charles, LA	Milk, dairy products	Expansion	1.1	5	-	Construction 7/86

H

Haa's Cookies	Plant City, FL	Cookies	30 acres	5	150	-	Planning 11/85

(Continued on page 76)



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Delaware is the small state with big advantages for food processors. Like fast, extensive transportation systems that put you no more than a day away from one-third of America's population. An abundant, clean water supply, including the Delaware River. A growing, skilled workforce that remains very cost competitive. Plus, there's a reason you won't find on a map or in a mound of statistics: accessibility of state government.

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DELAWARE
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Company	Plant Location	Primary Product	Square Feet/cap.	Est. Cost ($-million)	Employees	Architects Engineers	Status & Date
Haagen Dazs	Tulare, CA	Ice cream	Expansion	-	-	-	Planning 11/85
Hamakua Sugar	Hilo, HA	Meat proc.	-	2	22	-	Construction 5/86
Hardee's	Ardmore, OK	Dist. ctr.	10 acres	4	70	-	Construction11/85
Hass Candy	Hume, MO	Candy	-	-	12	-	Construction 1/86
Helix Int'l	Baton Rouge, LA	Rice products	-	1	10	-	Planning 9/86
Herr Foods	Oxford, PA	Snack foods	Expansion	1.3	30	-	Planning 5/86
Hester Industries	Moorefield, WV	Poultry proc.	Expansion	5.2	215	-	Planning 11/85
Heublein	San Mateo, CA	Bev. whse.	Expansion	-	-	-	Planning 11/85
Hill's Bros.	New Orleans, LA	Coffee	Expansion	10	120	-	Planning 9/85
Hill's Pet Prod.	Bowling Green, KY	Pet food	200M sq. ft.	17	135	Sverdrup	Startup 12/86
Hill's Pet Prod.	Topeka, KS	Pet foods	Expansion	1.2	40	-	Completed 7/86
Hilmar Cheese	Merced, CA	Cheese	Expansion	-	-	-	Planning 11/85
Holland & Nowotny	Van Buren, AR	Poultry proc.	Expansion	-	75	-	Planning 7/85
Howard B. Stark	Pewaukee, WI	Candy	Expansion	1	-	-	Planning 1/86
Huron Dress. Beef	Huron, SD	Beef	Expansion	1.5	40	-	Planning 12/85
H. W. Powers	Brockton, MA	Candy	-	2.7	39	-	Construction 4/86
Hygrade Foods	Jacksonville, FL	Meat proc.	-	2	50	-	Completed 4/86
I							
IBP, Inc.	Council Bluffs, IA	Hog slaughter	-	-	-	-	Startup 7/86
IBP, Inc.	Dakota City, NE	Meat packing	Expansion	2.5	-	-	Planning 9/85
Icicle Seafoods	Seattle, WA	Surimi analogs	-	2	-	-	Startup 5/86
Ingred. Tech. Corp.	Botkins, OH	Fruit systems	-	-	-	-	Startup 10/85
Imperial Paking	St. Louis, MO	Cookies	Expansion	1	50	-	Planning 9/85
Int'l Cheese	Hinesburg, VT	Cheese	Expansion	1.5	-	-	Completed 11/85
Interstate Brands	Columbus, IN	Baked goods	Expansion	3	-	-	Planning 9/85
Interstate Brands	Emporia, KS	Cakes	Expansion	3	-	-	Planning 9/85
Italgrani USA	St. Louis, MO	Seminola	-	10	-	-	Construction 9/85
J							
Jennie-O Foods	Melrose, MN	Turkey proc.	-	-	-	-	Completed 7/85
Jimmy Dean	Osceola, IA	Pork sausage	Expansion	9	-	-	Planning 8/85
J & J Snack Foods	Chicago Heights, IL	Soft pretzels	-	2	-	-	Planning 10/85
J. Pate Indus.	S. Beloit, IL	Cookies	-	-	35	-	Construction11/85
Just Desserts	San Francisco, CA	Baked desserts	Expansion	-	-	-	Planning 11/85
K							
Keebler	Bluffton, IN	Snack foods	Expansion	14	150	-	Construction11/85
Kellogg	Battle Creek, MI	Cereals	Renovations	500	-	Daniel Int'l	Construction 5/86
Kenlake Foods	Murray, KY	Powdered bvgs. desserts	Expansion	1.5	-	-	Planning 8/86
Keystone Pretzels	Lancaster, PA	Pretzels	9 acres	1.3	-	-	Construction 4/86
Kilpatrick's Bak.	Alameda, CA	Baked goods	Expansion	-	-	-	Planning 11/85
Kraft	Mattoon, IL	Bagels	70.5M sq. ft.	-	-	St. Onge, Ruff	Startup 5/86
Kraft	Stockton, IL	Swiss cheese	Expansion	4.7	-	-	Construction 9/85
Kretschmar Bds.	Concordia, MO	Prepared foods	Expansion	1	100	-	Construction 1/86

(Continued on page 80)

Insert 48 on Inquiry Card →

Company	Plant Location	Primary Product	Square Feet/cap.	Est. Cost ($-million)	Employ-ees	Architects Engineers	Status & Date
L							
Lamb Weston	Hermiston, OR	Frozen foods	Expansion	4.9	-	-	Planning 8/86
Lewis Bros.	Vincennes, IN	Baked goods	-	5	150	-	Planning 11/85
Loda Egg Farm	Loda, IL	Eggs	9 acres	3.5	50	-	Planning 12/85
Louis Rich	Exeter, CA	Turkey proc.	Ren.250Msqft.	15	-	Sverdrup	Completion '87
Loverseas	Goochland City, VA	Liqueur	-	-	50	-	Planning 11/85
Lundy Packing	Clinton, NC	Meat packing	Expansion	-	800	-	Planning 11/85
M							
Madeline Choc.	Rockaway Beach, NY	Chocolate candy	Expansion	1.5	-	-	Planning 7/86
Marma Maid	Newport News, VA	Dairy prod.	Expansion	1.7	10	-	Planning 9/85
Marshall Labs	Marshall, MN	Spray-dried	7M sq. ft.	0.5	10	-	Startup 1/86
Masa Food Prod.	Louisville, KY	Mexican chips	-	2.5	60	-	Planning 3/86
McCormick	Hunt Valley, MD	R&D flavors, spices	5 acres	-	-	-	Construction10/85
Meadowland Crmy.	Conroe, TX	Milk, orange juice	111M sq. ft.	-	-	Hixson	Completion '88
Michael Vineyards	Sonoma, CA	Wine	Expansion	-	-	-	Planning 11/85
Michigan Dairy	Livonia, MI	Milk	Expansion	-	-	Hixson	Completed 1/86

(Continued on page 83)

Can Opening Made Easy, Quick, Efficient

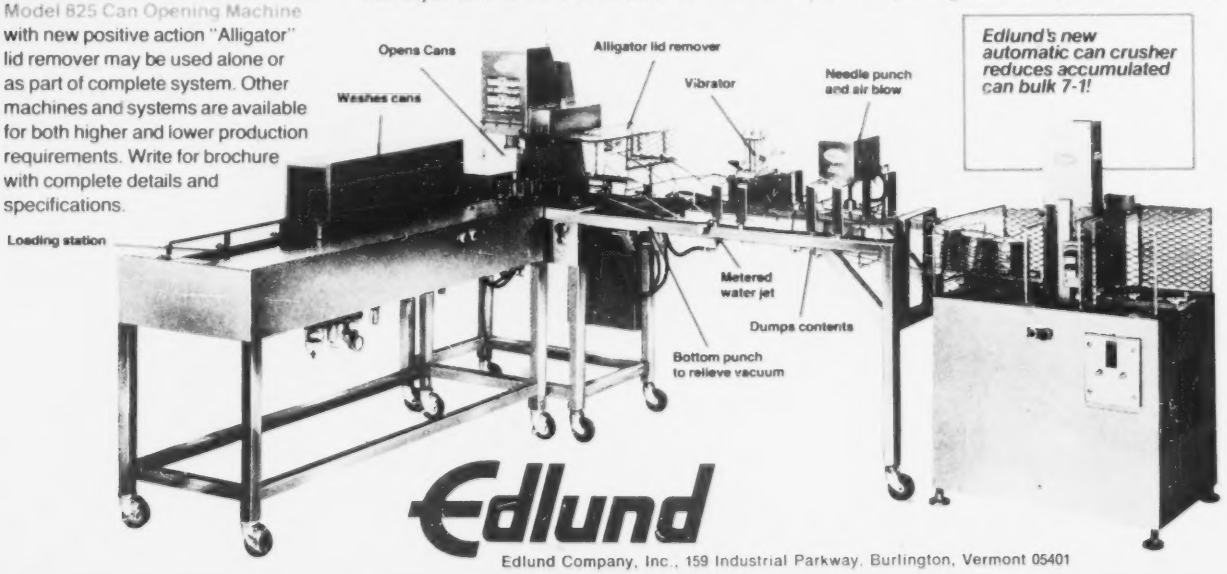
Model 825 Can Opening Machine with new positive action "Alligator" lid remover may be used alone or as part of complete system. Other machines and systems are available for both higher and lower production requirements. Write for brochure with complete details and specifications.

New! Positive action "Alligator" lid remover

This newly designed positive action lid remover automatically grips the lids of cans as they are opened, swings them away and releases them into a waste receptacle. Vise-like clamping action of lid remover jaws assures reliable lid removal every time.

Model 825 Can Opening System washes cans, opens cans, delids cans and dumps product automatically at a rate of 25 cans per minute with **one operator.** Various dumping assists may be selected to assure product removal: vibration, metered water jets, needle punch with air blow. Available with adjust able rails and can size conversion kits for quick set-up change from one can size to another.

Edlund's new automatic can crusher reduces accumulated can bulk 7-1!



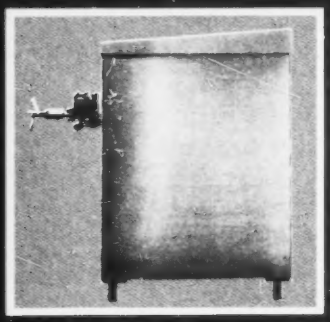
Edlund

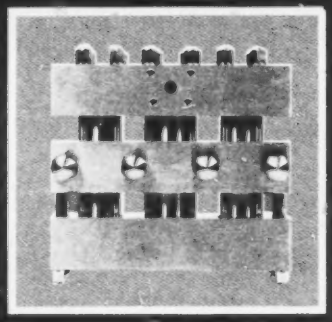
Edlund Company, Inc., 159 Industrial Parkway, Burlington, Vermont 05401

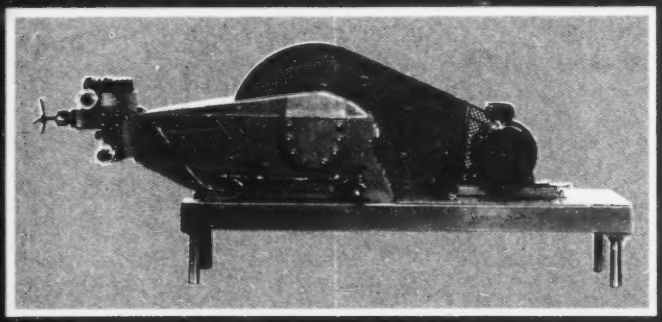
Company	Plant Location	Primary Product	Square Feet/cap.	Est. Cost ($-million)	Employees	Architects Engineers	Status & Date
Mid-Con Bottlers	Saylor, IA	Soft drinks	Expansion	5	25	-	Construction11/85
Middlesboro Coca Cola	Middlesboro, KY	Soft drinks	Expansion	1	-	-	Reported 9/85
Midstate Mills	Newton, NC	Wheat flour	Expansion	5	20	-	Construction 9/85
Milupa Co.	East Troy, NY	Baby food	Expansion	5	20	-	Constructoin 9/85
Milwaukee Saus.	Hales Corners, WI	Sausage	-	1	-	-	Planning 4/86
Minn. Dairy Tech.	Little Falls, MN	Cheese	-	95	200	-	Construction 8/85
Moger David	Westfield, NY	Wine	Expansion	3.9	-	-	Planning 7/86
Montinore Vineyard	Forest Grove, OR	Wine	Expansion	7	20	-	Planning 3/86
Montfort of CO	Greeley, CO	Meat packing	Expansion	4.5	800	-	Construction 7/86
Morrilton Pkg.	Morrilton, AR	Meat proc.	Expansion	3.2	-	-	Construction 6/86
Mrs Smith's	San Jose, CA	Frozen foods	Expansion	-	-	-	Planning 11/85
Murakami Farms	Ontario, OR	Proc. onions	Expansion	2	50	-	Construction 9/85
		N					
Naarden Int'l	Mount Olive, NJ	Flavors, frag.	66M sq. ft.	-	75	-	Construction10/85
Nalley's	Tacoma, WA	Snack foods	Expansion	-	-	-	Startup 9/86
Nat'l Starch	N. Kansas City, MO	Mod. starches	51M sq. ft.	30	-	PSI	Startup 11/85

(Continued on page 84)

- Pressures up to 14,500 P.S.I.
- Capacities from 25-10,580 GPH
- Efficient and energy saving homogenizing system
- Aseptic design available
- Automatic capacity and pressure control systems
- 3-part valve housing with interchangeable valve seats and ball valves in Stellite or tungsten carbide, ceramic pistons; for long life and ease of service
- 4 models–33 types
- Reversible interchangeable solid ceramic plungers







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Company	Plant Location	Primary Product	Square Feet/cap.	Est. Cost ($-million)	Employ-ees	Architects Engineers	Status & Date
N. C. Processing	Mount Olive, NC	Turkey proc.	600 acres	18	800	-	Planning 11/85
Neptune Fisheries	Newport News, VA	Shrimp	-	2.1	125	-	Planning 11/85
N.H. Co.	Yuma City, AZ	Lettuce	-	3.1	30	-	Planning 1/86
Norristown Beef	Hatboro, PA	Beef whse.	-	-	-	-	Construction12/85
North Country Fds.	Rice Lake, WI	Pizza	-	1.1	57	-	Planning 9/85
Nutricheese Co.	Oak Park, IL	Analog cheese	16M sq. ft.	5	-	Austin Co.	Startup 6/86
O							
Ocean Spray	Babcock, WI	Cranberries	Expansion	-	-	Hixson	Completed 9/86
O.K. Industries	Heavener, OK	Chicken proc.	40 acres	5.5	300	-	Planning 4/86
Oldham's Sausage	Holton, KS	Sausage	Expansion	2	50	-	Planning 12/85
Olympic Foods	Spokane, WA	Soft drinks	15 acres	3	-	-	Construction12/85
Oscar Mayer	Columbia, MO	Sausage	Exp. (70Msqft)	8	-	LGMEng/ Const.	Startup 1/86
Oscar Mayer	Kirksville, MO	Ham proc.	Ren.124Msqft	7	100	SverdrupDan	Startup 10/86
Owens Sausage	Richardson, TX	Sausage	-	4	20	-	Construction 7/86

(Continued on page 87)

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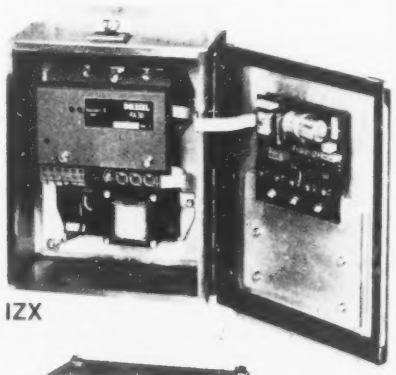

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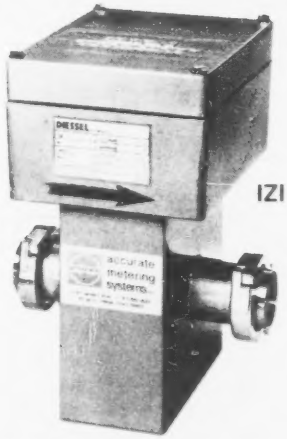

IZI

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Company	Plant Location	Primary Product	Square Feet/cap.	Est. Cost ($-million)	Employees	Architects Engineers	Status & Date
		P					
Palermo Baking	Portsmouth, OH	Baked goods	-	2	30	-	Completed 9/85
Paris Bakery	Webster, TX	Baked goods	-	3	-	-	Completed 7/86
Party Pac Popcorn	Greensboro, NC	Popcorn	-	0/3	40	-	Completed 11/85
Pepperidge Farms	Lakeland, FL	Cookies, crackers	24 acres	-	275	-	Planning 4/86
Pepsi-Cola Btlg.	Buena park, CA	Soft drinks	Renovations	-	-	MK-Ferguson	Completion mid-87
Pepsi-Cola Btlg.	Howell, MI	Soft drinks	Renovations	-	-	MK-Ferguson	Completed 8/86
Pepsi Cola	Madison, WI	Pepsi-Cola	Expansion	1.2	-	-	Construction12/85
Perdue Farms	Acomac, VA	Poultry proc.	Expansion	10	1650	-	Planning 7/85
Perdue Farms	Washington, IN	Prepared fds.	Expansion	1.5	150	-	Planning 11/85
Peter's Best Beef	Farmingdale, NY	Proc. meats	Expansion	2.8	45	-	Completed 11/85
Petri Baking	Silver Creek, NY	Baked goods	Expansion	2	39	-	Planning 11/85
Pilgrim Indus.	Mt. Pleasant, TX	Chicken proc.	-	-	350	-	Construction 7/85
Pontiac Foods	Pontiac, SC	Coffee, tea, spices	200M sq. ft.	-	-	Lockwood	Reported 9/86
Power Packaging	Manteno, IL	Frozen foods	-	3.5	150	-	Planning 6/86
Publix	Lakeland, FL	Baked goods	Exp. 110Msqft.	-	-	FoodPlantEng	Construction10/86
Publix	Lakeland, FL	Deli salads, rnts.	Exp.(60Msqft)	-	-	FoodPlantEng	Construction10/86
Purity Dairies	Nashville, TN	Ice Cream	-	4	50	-	Planning 9/85

(Continued on page 88)

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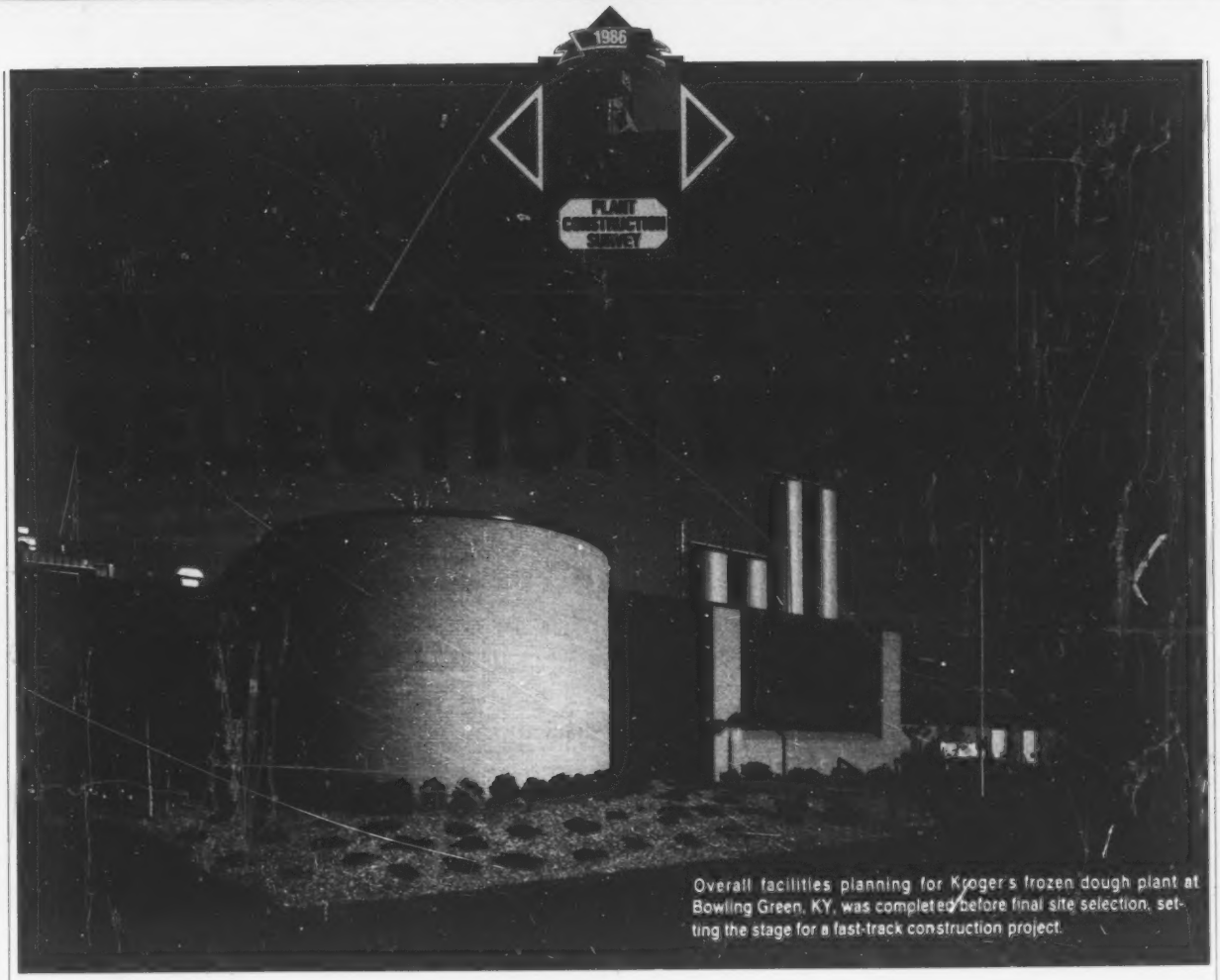
Soudronic

Company	Plant Location	Primary Product	Square Feet/cap.	Est. Cost ($-million)	Employees	Architects Engineers	Status & Date
Quaker Oats	St. Joseph, MO	Grain products	Expansion	18	-	-	Planning 5/86
Quali-Tech	Chaska, MN	Flavors, ingred.	45M sq. ft.	-	-	-	Completed late'85
Quality Food Oils	Fairfield, CT	Veg. oils	-	3.5	14	-	Planning 9/85
R							
Rainbo Baking	Sacramento, CA	Bread	Expansion	-	-	-	Planning 11/85
Ramsey Labs	Ft. Worth, TX	Fruit proc.	Expansion	2.2	16	-	Construction 4/86
Randolph Packing	Streamwood, IL	Meat packing	-	2	15	-	Planning 8/86
Reiter Dairy	Springfield, OH	Ice cream	Exp. (15M sqft)	-	-	Hixson	Completed late 86
RHM Co.	Joliet, IL	Snack foods	21M sq. ft.	8	-	Austin Co.	Startup 9/86
Rhomberg Brewing	Dubuque, IA	Beer	Renovations	-	-	-	Completed '85
Richardson Candy	Philadelphia, PA	Mints	30M sq. ft.	-	120	Siebert Eng.	Startup 4/86
Ridgeview Foods	Whitehall, WI	Soft cheese, proteins	Expansion	-	-	-	Reported 5/86
Robert Mondavi	Napa, CA	Wine	Expansion	-	-	-	Planning 11/85
Rocco Processing	Timberville, VA	Lamb proc.	Expansion	-	127	-	Planning 11/85
Roman Meal	Fargo, ND	Baked goods	Expansion	1	-	-	Construction 6/86
Ronnenberg Bwy.	Youngstown, OH	Beer	-	32.8	200	-	Construction 8/85
Rose Acre Farms	Winimac, IN	Poultry, eggs	643 acres	9.5	75	-	Construction10/85
Round Hill Winery	Napa, CA	Wine	Expansion	-	-	-	Planning 11/85
Royal Cup	Birmingham, AL	Coffee, tea	Expansion	2	275	-	Construction 7/85
Rudy's Farms	Florence, AL	Sausage	Expansion	3	80	-	Construction 9/85
S							
San-J Int'l	Hemrico Cty., VA	Soy sauce	10 acres	6.5	15	-	Planning 12/85
Sara Lee	Henderson, NV	Dist. ctr.	-	-	70	-	Construction 8/85
Sathers Co.	Chattanooga, TN	Candy, snacks	Expansion	6	50	-	Construction11/85
S. B. Thomas	Schaumburg, IL	Prepared fds.	Expansion	-	-	-	Planning 12/85
Schreiber Foods	Clinton, MO	Prepared fds.	Expansion	5	75	-	Construction 1/86
Schwartz Meat	Norman, OK	Proc. meats	Expansion	1	18	-	Reported 8/85
Scope Industries	Baltimore, MD	Pet food	-	1	-	-	Construction 6/86
Seaboard Farms	Elberton, GA	Poultry proc.	-	-	200	-	Construction 1/86
Silver Lk. Cookie	Islip, NY	Cookies	Expansion	-	150	-	Planning 11/85
Sky Bros.	Altoona, PA	Food service	Exp. (40Msq.ft)	2.5	-	St. Onge, Ruff	Startup 8/86
Snow King	Pottstown, PA	Frozen meats	Expansion	1	-	-	Planning 5/86
SE Spec. Foods	Laurel, MS	Muscadine,berry,juice,	30M sq. ft.	7	400	Sverdrup	Startup 1986
Southern Best	Burgaw, NC	Bacon	-	2.5	75	-	Construction 8/85
Southland Estate	Selma, NC	Wine	23 acres	2.1	8	-	Construction11/85
Southwest Canners	Amarillo, TX	Coca-Cola	-	10	60	-	Planning 1/86
Springwater Cookie	Springboro, OH	Cookies	-	2.5	60	-	Construction11/85
Stayton Cannery	Salem, OR	Repackaging	-	5.4	-	-	Planning 5/86
Steuben Foods	Elma, NY	Yogurt	180M sq. ft.	-	-	Hixson	Startup 7/85
Sun Harbor AL	Alabaster, AL	Canned pet food	-	-	-	-	Completed 11/85
T							
Takeda Chem. Prod.	Wilmington, NC	Vitamin B-1	1500 acres	15	100	Davy McKee	Completed 9/85

Company	Plant Location	Primary Product	Square Feet/cap.	Est. Cost ($-million)	Employees	Architects Engineers	Status & Date
Tara Foods	Itasca, IL	Prepared foods	2 acres	1.1	36	-	Planning 9/85
Tastybird Foods	Pine Bluff, AR	Poultry proc.	Expansion	1.5	-	-	Construction 6/86
T.G. Lee Co.	DeLand, FL	Dairy products	Expansion	3.2	12	-	Planning 6/86
T&M Nut Proc.	Merced, CA	Nuts	Expansion	-	-	-	Planning 11/85
Tone Bros.	Des Moines, IA	Spices	Expansion	-	100	-	Construction 11
Tony's Pizza	Salina, KS	Frozen pizza	Expansion	1	12	-	Construction 7/86
Trauth Dairy	Newport, KY	Ice cream, milk	Expansion	-	-	Hixson	Completed 4/86
Townsend Farms	Troutdale, OR	Raspberries	Expansion	1.5	-	-	Planning 9/85
Trenton Foods	Trenton, MO	Prepared fds.	Expansion	-	200	-	Construction 1/86
Tropicana	Bradenton, FL	Frozen orange juice	50M sq. ft.	-	-	St. Onge, Ruff	Startup 4/87
Twistee-Treat	Ft. Myers, FL	Ice Cream	Expansion	2	65	-	Planning 6/86
Tyson Foods	Rogers, AR	Poultry dist.	Expansion	12.2	35	-	Planning 12/85
Tyson Foods	Morrison Bluff, AR	Poultry proc.	-	-	-	-	Reported 8/86
U							
Uncle Ben's	Greenville, MS	Rice milling	Expansion	16.6	50	-	Construction 8/86
Universal Seafood	Dutch Harbor, AK	Surimi	-	10	130	-	Planning 9/85
V							
Valley Beverage	Merced, CA	Bvg. dist. ctr.	-	-	-	-	Planning 11/85
Valley Whsle, Mts.	Alamo, TX	Sausage	-	1.1	100	-	Construction 7/86
Vendervoot Dairy	Ft. Worth, TX	Milk	Renovations	-	-	Hixson	Completed 11/86
Van Dyn Choc.	Clark Cty., WA	Chocolate	-	4.7	-	-	Planning 8/85
Van Dyn Choc.	Eugene, OR	Confections	-	4.4	75	-	Planning 11/85
Vernor's Inc.	Detroit, MI	Soft drinks	3 acres	1.5	-	-	Planning 8/85
W							
Walton Foods	Bridgeton, NJ	Prepared foods	3 acres	2	30	-	Planning 4/86
Wenner Bread	Bohemia, NY	Baked goods	-	1.6	66	-	Planning 4/86
Western Sugar	Greeley, CO	Refined sugar	-	4.5	45	-	Completed 7/86
Western Sugar	Scottsbluff, NE	Sugar by-products	1,707 acres	9.8	200	-	Completed 12/85
Wilson Foods	Cherokee, IA	Prepared foods	Expansion	-	65	-	Planning 9/85
Wilson Foods	Marshall, MO	Meat packing	Expansion	5	80	-	Planning 10/85
Wilson Foods	Monmouth, IL	Hams	Expansion	2.8	100	-	Planning 12/85
Winky Food Prod.	Chicago, IL	Desserts	-	-	40	-	Completed 9/85
Wise Foods	Berwick, PA	Whse.	Expansion	3.5	-	-	Planning 10/85
Wornick Co.	New Braunfels, TX	Prepared foods	-	5.5	200	-	Planning 4/86
Wortz Biscuit	Poteau, OK	Baked goods	-	7	100	-	Construction 1/86
Y							
Y&S Candies	Lancaster, PA	Candy	Expansion	-	35	-	Planning 4/86
Z							
Zachary Co.	Frankfort, IN	Candy	-	0.5	120	-	Construction11/85
Zartic Co.	Rome, GA	Poultry proc.	-	-	100	-	Construction 6/86
Zemco Ind Russer Fd	Buffalo, NY	Proc. meats	Expansion	3	20	-	Planning 11/85



Overall facilities planning for Kroger's frozen dough plant at Bowling Green, KY, was completed before final site selection, setting the stage for a fast-track construction project.

Build a new plant? Renovate or expand an existing facility? Rehab an abandoned building? Here's how several food companies arrived at different site decisions—and why.

Dozens—sometimes hundreds—of criteria may be considered in a site selection study. Key factors typically include access to raw materials and markets, transportation costs, labor costs and availability, utility costs and availability, site development needs, taxes and financial incentives, political and regulatory problems, community attitudes and quality of life.

But in the end, "there's no such thing as a universally good location," observes James M. Bruce, Jr., director of management and economic consulting at Lockwood Greene Engineers, a major architectural/engineering firm offering site selection services. "Every site selection represents a trade-off between assets and shortcomings. The idea is to achieve an optimal match between a company's particular needs and the...conditions found in various alternative locations."

What follows are some examples of how several food companies applied varying criteria to arrive at optimum site decisions.

CHARLES E. MORRIS
Midwest Editor

Kroger: Fast-track project

Kroger Company's $20-million, 145,000 sq.-ft. frozen dough plant, started up in September 1981 at Bowling Green, KY, supplies oven-ready products to in-store bakeries operated by the chain's supermarkets throughout the North Central and Southern states. Transportation and distribution were therefore critical elements in site selection for a new plant, first of its kind for Kroger. From groundbreaking to startup, the plant was built in just 18 months on a fast project track following a feasibility study and "centroid analysis" conducted by a team made up of Kroger and Lockwood Greene engineers.

The feasibility study defined the scope of the project and included marketing forecasts; plant size and equipment projections; land, utility and waste treatment requirements; estimated costs and time to build—"all the imperatives which must be analyzed before you spend money," said Len Bednarski, who headed the Lockwood Greene study group.

Next step was the centroid analysis—a distribution study considering all the products, routes, distances and other transportation variables—to establish a "center of gravity" or mathematical distribution center. "Kroger was leaning toward a Kentucky loca-

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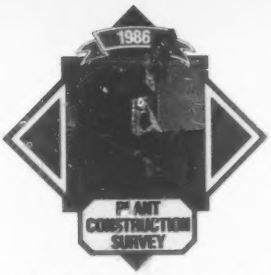

tion to begin with," said Bednarski, and the centroid study confirmed a Kentucky site as most efficient. Available sites at and around the center were then evaluated and several optimum sites identified. The feasibility study and site search together formed the basis for funding authorization and the "go-ahead" for final site selection and pre-engineering for a fast-track project (i.e., a tightly scheduled project where construction gets underway as drawings are produced and materials are delivered to the site).

By early 1980, as final design work was underway, geotechnical analysis revealed that soil conditions at the first-choice site, London, KY, were such that building there would create additional economic burdens for Kroger. Fortunately, an alternative site was identified and the project was quickly shifted from London to Bowling Green. Result: One month after the originally-scheduled startup date, the plant was in full operation and making a profit.

Steuben Foods rehab

Steuben Foods, a relatively new company formed in 1982 from the former Prattsburg division of Elmhurst Milk & Cream Co. in Jamaica, NY, needed expanded facilities to produce *Whitney's* yogurt for Whitney Foods, a subsidiary of Kellogg. A site selection study conducted by Steuben engineers and Hixson Engineers/Architects compared several options: 1.) Expanding the company's existing plant at Prattsburg, NY; 2.) Building a new plant from the ground up at available sites elsewhere in New York; 3.) Renovating an existing building at another location.

The first two alternatives were ruled out on the basis of established needs and cost effectiveness. Solution: A 786,000 sq.-ft. building abandoned 10 years ago by Western Electric at Elma, NY (about 15 miles outside of Buffalo) "which could be converted into a high-tech facility," said Stephen Schlegel, marketing manager at Hixson.

Hixson and Steuben engineers converted 172,000 square feet of the building into the new yogurt plant, which started up in July of last year, and Steuben is developing the rest of the site into "The Agri-business Center of Western New York." Steuben

(Continued on page 97)

Comparative Annual Operating Cost Simulation

A location study comparing geographically variable annual operating costs for a canned foods plant shipping 14.8 million lbs. per year and employing 300 people, conducted by The Boyd Co., shows Panama City, FL as the low cost location. The complete cost study is available from: The Boyd Co., Location Consultants, 310 N. Harrison, Bldg. B, Princeton, NJ 98540

	Chicago Metro Area	Minneapolis Metro Area	Cleveland Metro Area	New York Metro Area	Philadelphia Metro Area	Los Angeles/ Long Beach Metro Area	Atlanta Metro Area	Houston Metro Area
Nonexempt Labor								
Weighted Average Hourly Earnings	$ 10.09	$ 10.73	$ 11.16	$ 9.45	$ 9.88	$ 9.67	$ 8.95	$ 11.09
Annual Base Payroll Costs ($1,000)	5,763	6,129	6,375	5,398	5,643	5,524	5,112	6,335
Fringe Benefits ($1,000)	2,132	2,268	2,359	1,997	2,088	2,044	1,891	2,344
Total Labor Costs ($1,000)	$ 7,895	$ 8,397	$ 8,734	$ 7,395	$ 7,731	$ 7,568	$ 7,003	$ 8,679
Electric Power Costs ($1,000)	$ 242	$ 138	$ 205	$ 339	$ 231	$ 218	$ 192	$ 174
Occupancy Costs ($1,000)								
Amortization	$ 636	$ 634	$ 659	$ 702	$ 644	$ 694	$ 574	$ 618
Ad Valorem Taxes	184	137	103	195	120	60	75	73
Heating and Air Conditioning	122	86	98	132	91	27	52	27
Total Occupancy Costs ($1,000)	$ 942	$ 857	$ 860	$ 1,029	$ 855	$ 781	$ 701	$ 718
Total Power and Occupancy Costs ($1,000)	$ 1,184	$ 995	$ 1,065	$ 1,368	$ 1,086	$ 999	$ 893	$ 892
Transportation Costs ($1,000)	$ 465	$ 683	$ 449	$ 563	$ 499	$ 385	$ 253	$ 524
Total Annual Geographically-Variable Operating Costs ($1,000)	$ 9,544	$10,075	$10,248	$ 9,326	$ 9,316	$ 9,952	$ 8,149	$10,095

Source: The Boyd Company

envisions its yogurt plant as the anchor which can attract other food companies and suppliers into a vertically integrated food processing complex where tenants can share space and utility costs. "Our objective is not just to lease space but to provide synergy," says Ray Birdsall, manager of business development at Steuben Foods.

Major reasons why Steuben selected the Elma site, Birdsall added: 1.) Market access. Whitney's yogurt is a national brand, manufactured and distributed from one location, and 48 percent of the U.S. population (plus 62 percent of the Canadian population) is within a 500-mile radius of Buffalo. 2.) Good transportation. The Elma site is on county highways which access an interstate highway eight miles away, and – although Steuben doesn't currently ship by rail – five railroad lines totaling 8,500 feet of track served by ConRail are on site. Buffalo is also a trucking hub, with many common carriers. 3.) Proximity to raw materials. Milk – the plant's basic raw material – is supplied by several hundred New York dairy farmers. 4.) Pre-development, which minimized civil engineering work and kept construction costs down. "Millions of dollars had been invested by the former owner" in site development, said Birdsall. 5.) Assistance from the Erie County Industrial Development Authority, which "served as a clearinghouse for solving problems" and helped obtain a UDAG grant to improve the site and bring in utilities. Example: A seven mile pipeline with two pumping stations linking the site to the municipal wastewater treatment plant. 6.) A compatible labor supply. "People in Buffalo care about their jobs – they're skilled, trained, dedicated and have an excellent work ethic," said Birdsall. 7.) Utilities – available water, natural gas, electricity, wastewater treatment.

Campbell upgrade

Campbell Soup, currently renovating its 80-year-old original plant at Camden, NJ in a three-year $37-million project, was faced with the typical options in deciding what to do with an aging plant, said Plant Manager David E. Winkler at the *Food Plants '86* conference held October 1-3 by Food Plant Strategies at Cherry Hill, NJ. The alternatives: 1.) Do nothing – "appoint a committee to study the problem;" 2.) Tear the plant down and build a new one on the same site; 3.) Move to a new location; 4.) Modernize the existing facilities.

For community reasons, Campbell wanted to stay in Camden but had an obligation to its shareholders to assess the pros and cons, Winkler continued. One major criterion stressed by management: The evaluation should consider long-term implications, not just short-term gains.

The advantages of staying in Camden related mainly to the plant's location and included:

• *The people*, a well-trained work force, many of whom has been with Campbell for 30 to 40 years and more.

• *Logistics:* Within a 400-mile radius of Camden are 60 million consumers (one-fourth of the U.S. population) and 29 percent of U.S. canned food sales. Camden is served by an excellent transportation system; freight costs are only 75 percent those of the company's Paris, TX plant. Average shipping distance to the company's 460 retail customers is 210 miles versus 426 miles from its other canned foods plants; the average supplier (of 20 key items) is 127 miles closer to Camden than to the other canning plants.

Finally, the area has a good water supply and Campbell has good community relations of long standing.

Still, there were disadvantages inherent in the plant itself:

• *High operating costs:* Container production costs were 20 percent higher at Camden than at Paris (which has a similar product mix), and the cost of warehousing finished product was more than twice that of Paris.

• *Excess buildings*: The 12-year-old Paris plant occupies 1.37 million square feet yet turns out more than twice as many cases per square foot as the 2.36-million sq.-ft. Camden complex.

• *Poor communications*: The multistory Camden plant was built in the days when "gravity flow" was the norm.

Campbell's decision: "To radically upgrade the existing facility," said Winkler, through:

• *Consolidation:* "Like an overweight person, the plant will lose excess poundage" by consolidating warehouse and distribution operations in one place and selling an offsite warehouse five miles away. In-house manufacturing of metal cans will be discontinued in favor of purchasing, to free space for other purposes and take advantage of the latest can technology. These moves will cut the current 2.4 million square feet in half and the number of buildings from 31 to 18.

• *Modernization:* New filling and closing equipment, realigned labeling operations, additional sterilizing systems, blending improvements, multiple receiving facilities and a computerized communications and reporting system will "help overcome the disadvantages of the multi-store layout," Winkler concluded.

Pioneer Foods

Another example of a food company which found an existing building suited to its needs is Pioneer Food Service, a division of Savannah Sugar Refining Co. Pioneer needed a Midwestern location offering market access via interstate highways for a raw sugar packaging plant.

Solution: A 25,000 sq.-ft. former toy plant at Jackson, MI, located through Consumer's Power Co., the local gas and electric utility. Wage scales, not among the lowest in South Central Michigan, were of secondary importance because the plant employs only 12 to 15 people. The plant fit Pioneer's size requirements and was equipped with the shipping docks it needed, said Richard R. Surbrook, director of economic development at Consumer's Power.

Assisted by industrial revenue bonds and tax abatement arranged through Consumer's Power, Pioneer installed automated packaging equipment and started up early this year.

Bottom line: With food plants getting fewer, bigger, more highly automated and more expensive, solid site decisions are more critical than ever.